

Original Research Article

Impact of fast food consumption on nutritional status of high school students in South India

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ABSTRACT

Background: There is an increase in fast food consumption (FFC) among teenagers globally including India, but with a limited data on FFC, its influence on body weight, body mass index (BMI) in Indian high school students (HSS), which were analysed in this cross-sectional, questionnaire-based survey.

Methods: After training the participants on various aspects of FFC, responses for the questionnaire were analysed the influence of various factors on FFC were evaluated.

Results: Of 230 participants, 70% were females. The mean±SD age was 14.1±0.74 years. Seventy-three percent were regular consumers of FF. Only 5.22% were overweight. Regular meals were skipped by 74.3%. Influence of reviews by family, friends (76.5%) in deciding the dining place was high. Branded FFs (pizzas 58.7%, burgers 60.4%) were preferred but locally prepared, less expensive, easily available food (samosas 91.7%, puffs and pastries 90%, aerated soft drinks 86.1%) were consumed. FFC with friends (72.2%), family (71%) either at home (89.1%), near school premises (70%), school cafeterias (43.9%). Parents (100%) were aware of FFC by their children. Despite high awareness regarding the harmful effects of FF (79.1%), 73.6% continued FFC. Good physical activity was reported in 70.87%; active involvement in sports (60.4%) is associated with less FFC and skipping regular meals (27.0%) but statistically insignificant ($p>0.05$). None had any systemic disorder attributable to FFC.

Conclusions: Regular FFC, skipping regular meals is high among teenagers. Parents were aware of their children's dietary habits. Acceptance, affirmation from family, peers, promotes FFC.

Keywords: Body mass index, Fast food consumption, Parental approval, Physical activity

INTRODUCTION

The changes associated with globalization has affected not only the lifestyle but also the food habits, particularly in the younger generation. Changing demographics with more working women, increase in income, greater spending capacity and nuclear families have shifted intake of traditional food made from locally available products to FF; with the entry of FF giants of USA into India in 1996 changed the dining habits of young Indians giving more access to the western food. Though expenditure on dining out by Indians (US\$ 20) is

comparatively less compared to other developed Asian countries such as Japan (US\$ 213), Singapore (US\$ 212), Hong Kong (US\$ 195), FF industry has grown approximately 15% annually, reaching 1010 crores by 2018.¹ With television advertisements targeting the vulnerable population particularly children, teenagers and parents becoming more lenient towards FFC, without realizing the future health hazards resulted in the promotion of FF craze. Children in the middle and high school often have more access due to unsupervised independent dining out allowed frequently by liberal parents.

India, being a lower-middle-income country, apart from struggling with various infections battling undernutrition on one side and overnutrition/malnutrition on the other in children and young adults is not yet ready to face the health challenges caused by FF.

There were limited studies in India highlighting the FFC, its influence on body weight, in high school children, hence, our study aimed to identify factors related with FFC and its association with BMI in highly vulnerable population. The objectives of the study were to assess the effect of PFC on body weight, BMI and evaluate the impact of various factors on FFC among the high school students.

METHODS

This cross-sectional study was conducted by the community medicine department of a medical college in south India after obtaining Institutional Ethics Committee's approval; parent information sheets, written informed consent forms and assent were reviewed by the IEC. The study was carried out among students between 13-16 years of age (class 8th to 10th standard) during 2016-18.

Before beginning of the academic year, we approached management committee/principals of two schools and explained the study objectives and methodology and permission to conduct the study was obtained. Parent information sheets were provided to the parents; written informed consent from parents and assent from the students was taken. All students in the class 8-10 of the two schools identified, in the age group of 13-16 years, whose parents provided consent and those who gave assent were included in the study.

A pre validated, semi structured questionnaire was provided to the students.² A single researcher provided information to students regarding the study and answered their queries to ensure uniformity in information presented. Questionnaire contained socio-demographic details of the student, intake of various food items, factors that influence dietary intake, awareness about its health hazards and information of healthy diet and exercising. Following the completion of the questionnaire, height and weight was measured using standard guidelines and BMI was calculated. To reduce recall bias, questionnaire focused on the preceding one month.

The following operational definitions were used.

Regular consumption

Consuming fast food >3 a week. Healthy: FFC of <3 times/week. Unhealthy: regular consumption of FF >3 per week.

Skipping of meals missing of regular home cooked meals after having FFs or replacing the meal entirely with FF items.

Awareness of diseases caused due to regular consumption like obesity, hypertension and other heart diseases, diabetes and cancers.

Adequate physical activity was determined using guidelines provided by the Centre for Disease Control (CDC), Atlanta, USA.³

Statistical analysis

The study was carried out till the required sample size was reached. Considering a 95% confidence level, 10% relative precision and reported proportion of fast-food eaters among high school students to be 30.3% from a previous study, a sample size of 905 was obtained.⁴

Data was captured on Microsoft excel worksheets (2007) and analysed using IBM Statistical package for social sciences (SPSS) Inc, v23. Frequency and Chi square tests were applied. A $p < 0.05$ was considered to be statistically significant.

RESULTS

A total of 929 students answered the questionnaire, of which 23 were incomplete, hence were not considered for analysis. Of the 906 responses analysed, 542 (59.8%) were from males and 364 (40.2%) from females. The mean $\pm$ SD age of the participants was 14.23 $\pm$ 0.86 years and 14 years was the median age. Demographic characteristics of the study population is given in table 1.

Of 906 students, 253 (27.9%) were regular consumers of FF, high among females (n=149/253, 58.89%); 491 (54.2%) had a consumption history of >5 years. Skipping of home cooked meals was noted in 694 (76.6%) students in the preceding month, high among females (410, 75.6%) (Table 1). Reviews by family and friends (653, 72.1%) were the most common factor in deciding where to eat. There was a preference for branded fast food such as Pizzas (533, 58.8%), burgers (555, 61.3%) among the students. The most commonly consumed food items were locally prepared, less expensive, easily available such as samosas (n=833, 91.9%), bakery items such as puffs and pastries (n=813, 89.7%) and aerated soft drinks (n=782, 86.3%).

Place of consumption was home (n=808, 89.2%), near school premises (n=396, 43.7%) and school cafeterias (n=326, 36.0%). Fast food was consumed mainly with friends (n=588, 64.9%) and family (n=591, 65.2%). Parents of all (100%) respondents were aware of FFC by their children.

Table 1: Demographic characteristics of study population.

Parameters	Total	Male	Female
	N (%)	N (%)	N (%)
Number	906	542 (59.8%)	364(40.2%)
Age			
Mean±SD	14.23±0.86	14.19±0.81	14.29±0.92
Median	14.0	14.0	14.0
13 years	188 (20.8)	110 (20.3)	78 (21.4)
14 years	382 (42.2)	240 (44.3)	142 (39.0)
15 years	336 (37.1)	192 (35.4)	144 (39.6)
Height (cms)	148.74±13.5	149.35±13.4	148.13±13.4
Weight (kgs)	41.62±9.09	41.89±9.36	41.21±8.64
BMI (mean±SD)	18.8±4.9	18.8±5.2	18.8±4.8
Underweight <5th percentile	251 (27.7)	127 (23.4)	124 (34.1)
Healthy weight 5th percentile to 85th percentile	553 (61.0)	341 (62.9)	212 (58.2)
Overweight 85th to <95th percentile	102 (11.3)	74 (13.7)	28 (7.7)
Obesity (≥95th percentile)	0	0	0
Regular consumption	253 (27.9)	149 (27.5)	104 (28.6)
Skipping of meals	694 (76.6)	410 (75.6)	284 (78.0)
Awareness of health hazards of FFC	474 (52.3)	266 (49.1)	208 (57.1)
Active involvement in sport/physical activity	387 (42.7)	237 (43.7)	150 (41.2)

Table 2: Comparison of awareness of fast food consumption, advise to control FFC, impact of physical activity and BMI.

Parameters		Underweight	Normal	Pre Obese	Total	X ²	P value
		N (%)	N (%)	N (%)			
Gender	Male	127 (23.4)	341 (62.9)	74 (13.7)	542	16.540	0.000
	Female	124 (34.1)	212 (58.2)	28 (7.7)	364		
Frequency	Healthy	185 (28.3)	397 (60.8)	71 (10.9)	653	0.662	0.718
	Unhealthy	66 (26.1)	156 (61.7)	31 (12.3)	253		
Awareness of adverse effects of FF	Yes	61 (14.1)	306 (70.8)	65 (15)	432	78.502	0.000
	No	190 (40.1)	247 (52.1)	37 (7.8)	474		
Advised to control	Yes	63 (27.4)	145 (63.0)	22 (9.6)	230	0.999	0.607
	No	188 (27.8)	408 (60.4)	80 (11.8)	676		
Physical activity	Yes	87 (16.8)	357 (68.8)	75 (14.5)	519	75.453	0.000
	No	164 (42.4)	196 (50.6)	27 (7.0)	387		
Part of sports team	Yes	114 (22.5)	319 (62.9)	74 (14.6)	507	23.376	0.000
	No	137 (34.3)	234 (58.6)	28 (7.0)	399		

Table 3: Relationship between fast food consumption habits and body mass index.

Parameters		FFC	Underweight	Normal	Overweight	X ²	P value
			N (%)	N (%)	N (%)		
Gender	Male	<3 times/week	98 (24.9)	247 (62.8)	48 (12.2)	3.552	0.169
		> 3 times/week	29 (19.5)	94 (63.1)	26 (17.4)		
	Female	<3 times/week	87 (33.5)	150 (57.7)	23 (8.8)	1.720	0.423
		> 3 times/week	37 (35.6)	62 (59.6)	5 (4.8)		
Aware of adverse effects	Yes	<3 times/week	139 (39.7)	184 (52.6)	27 (7.7)	0.115	0.944
		> 3 times/week	51 (41.1)	63 (50.8)	10 (8.1)		
	No	<3 times/week	46 (15.2)	213 (70.3)	44 (14.5)	1.036	0.596
		> 3 times/week	15 (11.6)	93 (72.1)	21 (16.3)		
Advised Diet control	Yes	<3 times/week	147 (28.4)	313 (60.4)	58 (11.2)	1.020	0.601
		> 3 times/week	41 (25.9)	95 (60.1)	22 (13.9)		
	No	<3 times/week	38 (28.1)	84 (62.2)	13 (9.6)	0.105	0.949

Continued.

Parameters		FFC	Underweight	Normal	Overweight	X ²	P
		> 3 times/week	25 (26.3)	61 (64.2)	9 (9.5)		
Physically Active	Yes	<3 times/week	125 (44.5)	136 (48.4)	20 (7.1)	2.127	0.345
		> 3 times/week	39 (36.8)	60 (56.6)	7 (6.6)		
	No	<3 times/week	60 (16.1)	261 (70.2)	51 (13.7)	1.175	0.556
		> 3 times/week	27 (18.4)	96 (65.3)	24 (16.3)		
Part of sports Team	Yes	<3 times/week	104 (35.4)	170 (57.8)	20 (6.8)	0.553	0.758
		> 3 times/week	33 (31.4)	64 (61.0)	8 (7.6)		
	No	<3 times/week	81 (22.6)	227 (63.2)	51 (14.2)	0.150	0.928
		> 3 times/week	33 (22.3)	92 (62.2)	23 (15.5)		
Skip meals	Yes	<3 times/week	117 (25.3)	289 (62.4)	57 (12.3)	0.329	0.848
		> 3 times/week	62 (26.8)	139 (60.2)	30 (13.0)		
	No	<3 times/week	68 (35.8)	108 (56.8)	14 (7.4)	3.418	0.181
		> 3 times/week	4 (18.2)	17 (77.3)	01 (4.5)		

Table 4: ODDS and adjusted ODDS for BMI and related factors.

Parameters		BMI		Unadjusted OR	P value	Adjusted OR	P value
		Underweight and normal	Pre-obese				
Diet	Unhealthy	222	31	1.447 (CI 0.73-1.794)	0.55	0.860 (CI 0.542-1.366)	0.524
	Healthy	582	71				
Unaware of harmful effects	Yes	367	65	2.0918 (CI 1.3651-3.2055)	0.000	0.548 (CI 0.335-0.897)	0.017
	No	437	37				
Advised to control consumption	Yes	208	22	0.788 (CI 0.4791-1.296)	0.398	1.442 (CI 0.855-2.435)	0.170
	No	596	80				
Physical Activity	Yes	444	75	2.252 (CI 1.4199-3.5725)	0.000	0.787 (CI 0.438-1.414)	0.423
	No	360	27				
Part of Sports Teams	Yes	433	74	2.264 (CI 1.4246-3.5743)	0.000	0.563 (CI 0.334-0.953)	0.032
	No	371	28				

The harmful effect of FF was known to 474 (52.3%) students. They were aware of the use of coloring agents, food preservatives, high fat, salt and sugar content. Adverse effects such as dental caries, weight gain, diabetes and hypertension were stated by the students. At the end of the study, 349 (73.63%) of them were still consuming fast food.

There were no obese students in our study. Only 102 (11.3%) were pre-obese/overweight, while majority 88.7% of students were either of normal weight or underweight despite FFC (Table 2). Awareness regarding the health hazards of FFC, physical activity and being part of the sports team had statistical significance (p=0.000).

There was no statistical significance between BMI and FFC in the participants (Table 3).

The dietary habits of the students were poor in 653 (72.1%); 694 (76.6%) skipped regular meals and 676 (74.6%) were advised to control their diet (table 2). They were either underweight (n=251, 27.7 %) or had normal BMI (n= 553, 60%) and pre obese (n=102, 1.3%) There was no statistical significance.

Students who exercised for 60 minutes almost all days of the week (n=387, 42.72%) or were part of sports teams (n=399, 44.04%) were categorized based on their BMI (table 3). Those who were actively involved in sports activities had reduced consumption of FF and skipping of regular meals (27.4%) but there was no statistically significant relationship (p>0.05) (Table 3). None of the participants complained of any systemic disorder, mood changes due to fast food consumption.

Table 4 shows unadjusted and adjusted Odd's Ratio for BMI with other factors studies, which was significant for

awareness regarding the health hazards of FFC and being part of sports team (Table 4).

DISCUSSION

Socio-economic changes, and peer influence are the key factors that induce and promote the consumption of FF among teenagers. In the initial phase, there is increase in calorie intake by the population. This increase is primarily from less expensive food items of vegetable origin (cereals, roots, tubers etc). As the economy grows the second transition takes place. In this phase, there is a shift towards meat, oils and sugar. The type of foods consumed and more importantly the nutritive quality of these food items is of importance due to its impact on health.⁵ The term fast food in our study covers not only the bakery items, western FF, but also Indian fast-food (chats, aloo tikki, samosa, pakora, pani puri, bhel puri).

Introduction to FF has been much earlier in life than thought; an Australian study has noted that primary school children aged 5-9 years consumed high calorie food consisting of bakery items, sweet spreads, desserts. Almost every child had a minimum of one serving and maximum of over three servings of junk food. Children from lower socio-economic class (SEC) consumed fast food more frequently.⁶ his study indicating that the seeds of unhealthy food practices are sown in the early years of life. As the FFC is directly related to obesity and its complications, it becomes essential to address vigorously.⁷ Similar observations were made by Ong et al among Chinese children indicating the influence of changing socioeconomic scenario on the dietary habit in early life; contrast to Australian children, Chinese children from lower SEC followed the traditional diet, and consumed less FF than those from upper SEC.⁸ Preference for high calorie food/FF was high among those from lower SEC.⁹ Consumption of FF in early childhood is known to affect academic achievements in later life.¹⁰ Hence, it is imperative to address the issue at the earliest. As the primary school children are dependents, unable/not allowed to take independent decision regarding their food and their food habits are controlled by either parents/grandparents, we chose to include high school children.

Participants in our study were teenagers (mean age 14.23 years), higher proportion of the students were aged 14 years (42.2%). Inclusion of primary school children, would have revealed the early consumption of FF in children. The proportion of those who consumed FF regularly (29.9%) was less but skipping regular meals (76.6%) high only 11.3% were overweight. There was no significant impact of FFC on body weight and BMI in our study.

Ethnicity, gender differences exist in the pattern of FFC.^{11,12} In our study, more male participants (59.8%) consumed fast-food. Studies have reported taking home

cooked food to school inculcated a healthy food habit among teenagers.¹³

Globally, FFC is more frequent among teenagers, Turkish study has reported 31.5% of adolescents consumed FF on daily basis while 34% consumed once week/month.¹¹ Fast food was the choice of snacks among 48.6%.¹⁴ Adolescents were more likely to order high calorie foods from fast food restaurants, sit down restaurants.¹⁵ Shau et al report that FFC among Taiwanese adolescents is significantly higher (88.1%).¹⁶ In our study, 27.9% of students were consuming FF on a regular basis. students who were consuming FF for more than 5 years were ~55%. Nithin et al noted a high rate of FFC (97%) among male students of same age group, in this district.² In our study, place of consumption was home (89.2%), near school premises (43.7%) and school cafeterias (36%); consumption with friends (64.9%) and family (65.2%) was common. It is advisable to restrict the FF stores in the neighborhood either of residence or school. Reviews by family and friends (72.1%) influenced the selection of dining place. Parents of all respondents were aware of FFC by their children was noticeable indicating acceptance by the society.

Shau et al assessed the functional gastro-intestinal disorders (constipation 17.9%, irritable bowel disease 3.81%, abdominal migraine 2.81%) among adolescents which was 26.8%, high among FF consumers (27.6% Vs without h/o FFC 20.6%) girls (35.9%) compared to boys (18.4%).¹⁶ This study focused on gastrointestinal effect of FFC, which was considered uncommon among FFC. Fast food consumption has shown to influence the mental health and behavior among adolescents; psychiatric distress, and violent behavior were reported among those who consumed junk food and salty food.^{17,18} None of our participants complained of any systemic disorders.

Xue et al observed increased FFC among Chinese teenagers is on the increase, 26.3% from 17.9% between 2004 and 2009.; consumption was more in boys aged 13-17, from lower and middle-income families, rural residence.¹⁹ Surprisingly, there was no significant association between FFC and obesity. An Australian study on children aged 11-13 years has reported that those from lower SEC tend to consume FF more frequently.²⁰ In contrast, Indian teenagers from upper SEC preferred FF than home cooked food.²¹

During adolescence there a person tends to spend more time with friends; 72% of participants in our study consumed FF with friends. The school canteen or other local joints fast food joints provide a convenient place to socialise with their friends outside of home school environments. Glanz et al.²² Also noted similar findings. The most common food items consumed were local savouries such as samosas, confectionaries and bakery items. While most students prefer branded food products like pizzas and hamburger, they were consumed cheaper and more easily accessible items. Availability of fast-food

centers in the vicinity of the school often influence the food habits of teenagers promoting consumption of FF and aerated drinks resulting in weight gain and obesity related health problems.

Fast foods contain high concentration of trans fatty acids that are dangerous to health.²³ There is a well-established positive relationship between FFC, obesity and blood pressure (BP) levels in children aged 6-19 years.²⁴⁻²⁶ Zhao et al have reported a high proportion of obese (11.1%) children in their study on FFC and its relationship with hypertension; obesity was more among girls (15.2%); there was a high proportion of children with central obesity (19.7%).²⁵ Positive association between faulty dietary habits such as FFC, inadequate/low physical activity, habit forming substance abuse particularly alcohol and tobacco with body mass index, BP in Indian adolescents is documented.²⁷ Malnutrition has been reported among teenagers (15-19 years) who consumed FF with 62.1% being underweight, and 11.9% overweight. Parental interference brought a difference, with reduction in malnutrition in 12.9%, and was significantly high (69.6%) among those who were without.²⁸

In our study, 76% skipped a home meal at least once in the previous month and 72% decide on where to eat based on the opinion of family and friends. Social factors such as influence of family, role of mothers in inculcating healthy food habits in availing the FF cannot be ignored; Ong et al^[8] have noticed that under the supervision of mother or grandparent, children followed a healthy diet pattern. Availability of home cooked food, concern of the family and friends to eat healthy food were associated with less affinity towards FF while sports team participation proved a risk factor for FFC.²⁹ Our study has showed being part of the sports team is helpful in reducing the FFC, similar to the study by Kourlabia et al.³⁰ Latter also noted a high prevalence of FFC among siblings and parents. A positive family environment helps manage weight in adolescents. With changing times, consuming FF regularly has become culturally acceptable. In this fast-paced world with increasing time constraints, there is pressure to prepare and consume food quickly. This results in poor nutritional choices and skipping of regular meals in favor of fast foods, which may lead to serious health issues affecting an entire generation that will soon be entering their productive years. Studies conducted in other settings also had similar findings.³¹

Availability of food, ready to eat preparations are helpful for a working family, but not without health hazards. Family dining FF consume high calorie, salts; obesity among both adolescents and parent is not uncommon. When FF purchasing is related to family dining, it was more likely that vegetables and milk are consumed along with it at home than when eaten outside. As our participants were students, either ate alone or in groups. Association between Frequent consumption of certain FF

and preference for salty food has been demonstrated by Kim et al.³² As excess salt consumption may lead to hypertension and complications later, measures to intervene at an early stage to discourage fast food consumption are needed.

The awareness among the participants regarding the health hazards of FFC was not sufficient; but despite being aware of health hazard (52.3%), of whom, more than 73% of them were still consuming fast food suggesting that providing only health education to students is insufficient but there is a necessity to employ a more comprehensive approach. Health education regarding the ill effects has been carried out, but in reality the awareness is not translated into practice. Acceptance by family and friends does not assist in educational efforts. This mirrors the finding noted by Brown et al that providing information on the nutritive content alone does not affect the food ordering behavior.³³ Higher price discourages buying intention and an increase in price of FF is effective in reducing consumption than health education.³⁴

Cost of fast food has a direct influence on the healthy diet, higher the cost more is the consumption of fruits and vegetables as noted in the adolescents. Participants in our study consumed locally available less expensive FF though preferred branded FF. Cutumisu et al have expressed concern over the food environment near the school, which promotes FFC among children.³⁵ High density of well connected, easily approachable FF centres is a risk factor a higher number of students even that of elementary schools can avail the fast food, which in turn increases the frequency of obesity.^{11,36} While there is a clear association between increased caloric intake and being overweight, we were unable to find such a relationship, as only 11.3% were pre-obese. No statistical significance was noted among FF intake and gender, BMI, physical activity or participation in sports. This mirrors the results of previous studies.^{37,38} The reason for such low rates is beyond the scope of the study.

Change in food habit from consumption of FF to healthier nutritive diets during the transition period from adolescence to a young adult has been noted in a prospective study conducted by Watts.³⁹ This longitudinal study advocated the importance encouraging positive health habits had long term effect to the dietary consumption in young adults. Hence, the importance of classes to imbibe healthy dietary habits in high school students, must not be forsaken.

As this is a cross sectional study, temporality and causation cannot be proved. Quantification of food could not be done nor the caloric content be assessed. While efforts were made to prevent recall bias, the possibility of under or over estimation by students of the fast food consumed and home meals skipped must be considered.

It is not just the consumption of FF, but the life style pattern, awareness regarding nutrition influences the energy intake and obesity. Having family meal together, discussing the advantages of having healthy diet during dining may help in inculcate and follow a healthy food habit. A decreasing trend in FFC is noted in few ethnic groups (Hispanics), that encourages us to take measures to curb unhealthy food habit.⁴⁰ Encouraging home cooking practices with easy, less time-consuming foods and involving teenagers in the process may help in improving the food habits. At the community level, making the healthy food products affordable is recommended. In the long term, a holistic approach involving parents and schools needs to be considered.

CONCLUSION

Regular FFC, skipping of regular meals is high among the study participants. Parents were aware of their dietary habits and also shared FF with their children. Acceptance and affirmation from their family and peers, promotes FFC. High awareness regarding the health hazards of regular FF does not change the dietary consumption patterns, indicating the need to engage at the emotional level rather than using information to change the consumption patterns to healthier options.

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